REMARKS

Claims 1-4 are pending in the application. This application is currently under appeal to the Board of Patent Appeals and Interferences. The Examiner's Answer to the Appeal Brief presents a new theory of inherency not previously presented in any office action, and which necessitates the submission of additional evidence of patentability. Accordingly, Applicants withdraw their appeal with this Request for Continued Examination, in order to have additional evidence entered into the record and considered by the Examiner. In connection with the arguments presented below Applicants submit seven (7) Material Safety Data Sheets (MSDS) for various polyether polyols, ethylene oxide and propylene oxide, and a copy of pages from the cited reference.

Rejections under 35 U.S.C. § 103(a)

Claims 1-4 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. 5,243,012 to Wicks et al., U.S. 5,236,741 to Zwiener et al. or U.S. 5,126,170 to Zwiener et al. Applicants respectfully traverse this rejection.

It was previously asserted in the advisory action and the previous office actions that the compounds of Claim 1 are somehow inherently formed in the compositions disclosed in the three patents because the patents supposedly show "the same reactants under the same conditions as the claimed process then with alkylene oxides... etc." and that the reactants can be "mixed in any sequence". The basis for this assertion was the description of the preparation of polyether polyols found at column 4, for example in the Wicks patent, at lines 29-41. Preparation of polyether polyols from suitable alcohols and alkylene oxides such as ethylene oxide and propylene oxide is described in this paragraph. At lines 39-41, Wicks states: "These alkylene oxides may be introduced into the alkoxylation reaction in any sequence or as a mixture". Applicants explained in response that the claimed compounds are not inherently formed or disclosed in the cited patents because the cited patents do not disclose reaction of (nor is any such reaction inherently occurring) an alkylene oxide with an aspartate intermediate, as in the present invention.

It is now asserted in the Examiner's Answer to the Appeal Brief that if an excess of alkylene oxide is used to form the polyether polyols, after forming the polyether polyols the remaining alkylene oxide can react with the aspartate intermediate to form the compounds of the present invention. It is asserted that the question is "whether ethylene oxide or propylene oxide *can* (emphasis added) react with the resulting product of step A" (the aspartate intermediate).

Applicants again respectfully submit that there is no reaction of any aklyene oxide with any aspartate intermediate in the cited references. There is no alkylene oxide remaining in any polyol used to make the prepolymers of Wicks or Zweiner, and thus the reaction with the aspartate intermediate is not inherently occurring.

The process of making polyether polyols from alcohols and alkylene oxides is well known. In the process, a catalyst and a starter alcohol are placed in a reactor, the reactor is heated, and the alkylene oxide is continuously fed into the reactor. When the desired molecular weight of the end product is reached, the reaction is stopped (the alkylene oxide feed is discontinued). During polymerization, the pressure of the reactor is monitored. If the pressure of the reactor increases, this is an indication that the alkylene oxide is not reacting, perhaps, for example, due to the catalyst becoming inactive. After the reaction is stopped, the pressure begins to drop as the alkylene oxide remaining in the reactor is used up. When the pressure is no longer decreasing, this indicates that all alkylene oxide has been consumed. The product is further vacuum stripped at high temperature, under nitrogen, to remove any remaining small amount of alkylene oxide. This process is described, for example, in The Polyurethanes Book, Lee, S. and Randall, D. editors, John Wiley and Sons Ltd., 2002, pp.94-95.

There is no alkylene oxide remaining in a polyether polyol product. As is well known to one skilled in the art, ethylene oxide and propylene oxide are extremely toxic and reactive materials. Both are known to cause cancer. See, e.g., the attached Sigma-Aldrich MSDS for each of these materials, describing in detail the hazards of using these compounds. Because of the toxicity and reactivity of the alkylene oxides, their presence in any commercial polyol would be extremely undesirable. Additionally, if any alkylene oxide did remain in the end product, it would interfere with the OH number, because it would react with water to produce

ethylene glycol, for example, which would titrate as a diol. This does not in fact occur, as the titration is typically at the theoretical value.

As further evidence that there is no alkylene oxide in commercial polyether polyols, attached hereto are the MSDSs for five commercial polyols prepared by Bayer MaterialScience and by Dow Chemical Company. All five MSDSs state that the material is non-hazardous. If any alkylene oxide remained in the polyether polyol, this would be reported in the MSDS.

Thus, the description in Wicks, Zweiner '741 and Zweiner '170 of a general method of preparing polyether polyols would be understood, by one skilled in the art, as a method in which the end product does not contain alkylene oxides. The question is not one of "*can* the alkylene oxide react with the aspartate intermediate" but whether in fact it does react. It is abundantly clear that no such reaction is occurring. Wicks, Zweiner '741 and Zweiner '170 simply do not teach or remotely suggest the reaction of an oxirane with an aspartate intermediate, as in the present invention, to arrive at the claimed compounds. Applicants respectfully submit that Claims 1-4 are not obvious in view of the references cited and request withdrawal of the §103 rejection and allowance of all pending claims.

CONCLUSION

Applicants respectfully submit that all pending claims, Claims 1- 4, are patentable and that the present application is in condition for allowance; such action is respectfully requested at an early date.

Respectfully submitted,

By _____
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The polyurethanes book

Editors: David Randall and Steve Lee

Distributed by

JOHN WILEY & SONS, LTD

The common initiators for polyether polyol manufacture are summarised in Table 6-1.

Table 6-1 Initiators for polyether polyol production

Polyol starter	Functionality	Polyol starter	Functionality
Carbohydrate sources		Amine starters	
Sucrose	8	Alkanolamines (e.g. mono-, di-, triethanolamine)	3
Sorbitol	6	Ethylene diamine	4
Methyl glucoside	4	Diethylene triamine	5
Aliphatic starters		Toluene diamine	4
Glycols	2	Diaminodiphenylmethane	4–5.5
Glycerol	3	Mannich bases	3–7
Trimethylolpropane	3		
Pentaerythritol	4		

Three groups of catalysts will polymerise propylene oxide, with different reaction mechanisms and end products. The mechanisms are anionic (base catalysis), cationic (acid catalysis) and co-ordination rearrangement. Traditionally, the anionic catalyst, potassium hydroxide (used at 0.2 to 1.0 per cent on the final weight of the polyol) has been used for the production of polyether polyols.

Recently, caesium hydroxide and double metal cyanide catalysts have been commercialised for polyether polyol production whilst some rigid polyols are manufactured using tertiary amine catalysts.

Anionic polymerisation with potassium hydroxide

Mixing the selected initiator with a concentrated aqueous solution of potassium hydroxide, usually one potassium ion to 10 to 50 hydroxyl groups, produces a mixture (the initiator solution) containing the potassium salt of the initiator.

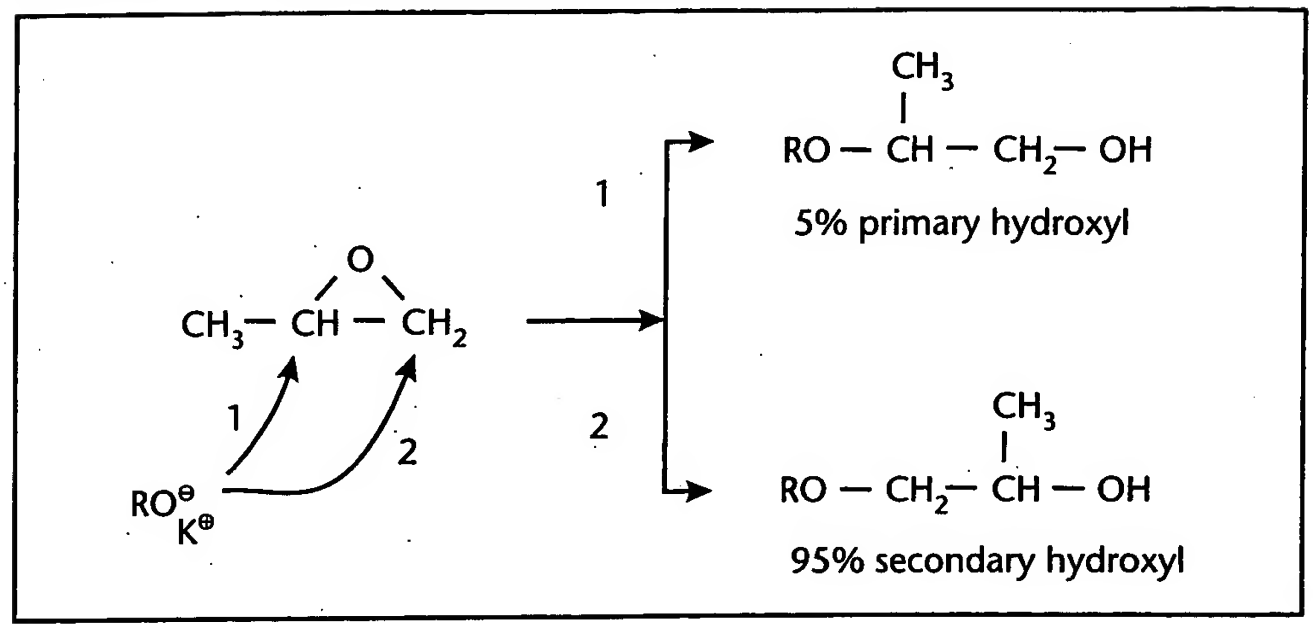
Since water is a di-functional initiator, its level in the initiator solution needs to be controlled. For many polyols the water is stripped out prior to propylene oxide addition to minimise propylene glycol formation.

Propylene oxide is added to the initiator solution, in the absence of oxygen, under pressure (three to five atmospheres) at reaction temperatures in excess of 90°C (typically 105 to 120°C). The reaction is exothermic, requiring heat removal.

The reaction is of the SN_2 type, with nucleophilic attack of the alkoxylate group on either of the two carbons of the oxirane ring, followed by ring opening, Figure 6-7.

The reaction occurs preferentially (95 per cent) at the less sterically hindered and more electrophilic primary carbon atom, and in consequence the commercial alkali-catalysed process results in propylene oxide polyols containing almost

Figure 6-7 *Ring opening of propylene oxide*



exclusively secondary hydroxyl groups which are much less reactive with isocyanates than the less hindered primary hydroxyl groups. It also means that the polymer backbone consists of repeating 'head-to-tail' units.

Proton transfer between the hydroxyl and alkoxide groups is very rapid and much faster than the rate of propylene oxide addition. This results in propylene oxide addition taking place with equal probability over all the end groups, producing a polymer with a much narrower molecular weight distribution compared to polyesters.

Addition of propylene oxide is continued until the desired molecular weight is reached. During polymerisation, the volume of product in the reactor increases and for a typical low molecular weight polyol, used for rigid foams, the build up ratio (final volume of polyol to volume of initiator) is between 2:1 and 4:1 and the polymerisation can be completed in a single step. For higher molecular weight polyols, used in flexible foam applications, the build up ratio is significantly higher, between 30:1 and 85:1 and polymerisation is carried out in at least two stages, initially preparing an intermediate of molecular weight around 500 to 1,000, and then reacting this in a second step to give the final polyol.

At the end of propylene oxide addition the reactor is under pressure and contains un-reacted propylene oxide dissolved in the polyol phase. As this reacts away the pressure in the reactor gradually decreases – a step referred to as 'cook-down'. In some processes a stripping stage may be included during or at the end of 'cook-down' either to reduce production time or to remove residual levels of alkylene oxide.

Reaction times vary considerably dependent on the polyol type, with low molecular weight ethylene diamine initiated polyols being completed in two to three hours, whilst for more complex high molecular weight polyols the reaction may take 12 to 24 hours.

Sigma-Aldrich, 3050 Spruce Street, St. Louis, MO 63103, US
phone: 314 771 5765, fax: 800 325 5052
emergency phone: 414 273 3850 Ext. 5996 Source: SAF-CDROM, valid 02/06 - 04/06

1. CHEMICAL IDENTIFICATION

Product Name	(+/-)-PROPYLENE OXIDE
Product Number	82320
Brand	FLUKA
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS, MO 63103 USA
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substance Name	CAS #	SARA 313
PROPYLENE OXIDE	75-56-9	Yes

Formula: C3H6O

Synonyms: AD 6 (suspending agent) * Epoxypropane * 1,2-Epoxypropane * 1,2-Epoxypropane (ACGIH:OSHA) * 2,3-Epoxypropane * Ethylene oxide, methyl- * Methyl ethylene oxide * Methyloxacyclopropane * Methyl oxirane * NCI-C50099 * Oxirane, methyl- * Oxyde de propylene (French) * Propane, epoxy- * Propene oxide * Propylene epoxide * Propylene oxide * 1,2-Propylene oxide * Propylene oxide (DOT:OSHA)

RTECS Number: TZ2975000

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Flammable (USA) Extremely Flammable (EU). Toxic.
May cause cancer. Causes burns. Harmful by inhalation, in contact with skin and if swallowed.
Readily absorbed through skin. Target organ(s): Central nervous system. Calif. Prop. 65 carcinogen.

HMIS RATING

HEALTH: 3*
FLAMMABILITY: 4
REACTIVITY: 1

NFPA RATING

HEALTH: 3
FLAMMABILITY: 4
REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

4. FIRST-AID MEASURES

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

5. FIRE FIGHTING MEASURES

FLAMMABLE HAZARDS
Flammable Hazards: Yes

EXPLOSION HAZARDS
Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

CONDITIONS OF FLAMMABILITY
Under fire conditions, material may decompose to form flammable and/or explosive mixtures in air.

FLASH POINT
-34.6 °F -37 °C Method: closed cup

EXPLOSION LIMITS
Lower: 2.1 % Upper: 37 %

AUTOIGNITION TEMP
748 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.
Unsuitable: Carbon Dioxide, dry chemical powder, or appropriate foam. Water can be applied as a spray or fog and if properly applied is capable of extinguishing the fire by sweeping the flames off the surface of the burning liquid.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Flammable liquid. Vapor may travel considerable distance to source of ignition and flash back. Emits toxic fumes under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

7. HANDLING AND STORAGE

HANDLING
User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep container closed. Keep away from heat, sparks, and open flame.

SPECIAL REQUIREMENTS
May develop pressure. Open carefully. Heat sensitive. Cool to 0°C before opening.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS
Safety shower and eye bath. Use nonsparking tools. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	20 PPM
USA	MSHA Standard-air	TWA	100 PPM (240 MG/M3)
USA	OSHA.	PEL	8H TWA 100 PPM (240 MG/M3)
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH		LOWEST FEASIBLE CONCENTRTION

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Physical State: Clear liquid

Color: Colorless

Property	Value	At Temperature or Pressure
Molecular Weight	58.08 AMU	
pH	N/A	
BP/BP Range	34 - 35 °C	
MP/MP Range	-112 °C	
Freezing Point	N/A	
Vapor Pressure	444.103 mmHg	20 °C
Vapor Density	2 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.829 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	< 0.1 %	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	-34.6 °F -37 °C	Method: closed cup
Explosion Limits	Lower: 2.1 % Upper: 37 %	
Flammability	N/A	
Autoignition Temp	748 °C	
Refractive Index	1.366	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

10. STABILITY AND REACTIVITY

STABILITY
Stable: Stable.
Conditions to Avoid: Heat.
Materials to Avoid: Oxidizing agents Copper, Copper alloys, Strong acids, Strong bases, Peroxides, Alkali, Amines.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: May occur Product may explode if polymerization is initiated in closed containers

11. TOXICOLOGICAL INFORMATION

ROUTE OF EXPOSURE
Skin Contact: Causes burns.
Skin Absorption: Harmful if absorbed through skin. Readily absorbed through skin.
Eye Contact: Causes burns.
Inhalation: Harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Central nervous system.

SIGNS AND SYMPTOMS OF EXPOSURE
Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Can cause CNS depression.

TOXICITY DATA

Oral
Rat
380 mg/kg
LD50
Remarks: Behavioral:Excitement. Behavioral:Ataxia. Lungs, Thorax, or Respiration:Respiratory stimulation.

Inhalation
Rat
4,000 ppm
LC50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Other changes. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Lungs, Thorax, or Respiration:Dyspnea.

Intraperitoneal
Rat
150 MG/KG
LD50

Oral
Mouse
440 mg/kg
LD50
Remarks: Behavioral:Excitement. Behavioral:Ataxia. Lungs, Thorax, or Respiration:Respiratory stimulation.

Inhalation
Mouse
1,740 ppm
LC50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Other changes. Lungs, Thorax, or Respiration:Dyspnea. Gastrointestinal:Changes in structure or function of salivary glands.

Intraperitoneal
Mouse
175 MG/KG
LD50

Skin
Rabbit
1500 UL/KG
LD50

Oral
Guinea pig
660 mg/kg
LD50
Remarks: Behavioral:Somnolence (general depressed activity).
Liver:Other changes. Kidney, Ureter, Bladder:Other changes.

Oral
Mammal
440 mg/kg
LD50

IRRITATION DATA

Skin
Rabbit
415 mg
Remarks: Open irritation test

Skin
Rabbit
50 mg
6M
Remarks: Severe irritation effect

Eyes
Rabbit
20 mg
Remarks: Severe irritation effect

Eyes
Rabbit
20 mg
24H
Remarks: Moderate irritation effect

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Species: Rat
Route of Application: Oral
Dose: 10798 MG/KG
Exposure Time: 2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Gastrointestinal:Tumors.

Species: Mouse
Route of Application: Inhalation
Dose: 400 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 100 PPM
Exposure Time: 7H/2Y
Frequency: I

Result: Tumorigenic:Neoplastic by RTECS criteria.
Endocrine:Tumors.

Species: Rat
Route of Application: Subcutaneous
Dose: 1500 MG/KG
Exposure Time: 46W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic:Facilitates action of known carcinogens.

Species: Mouse
Route of Application: Inhalation
Dose: 400 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Species: Mouse
Route of Application: Subcutaneous
Dose: 272 MG/KG
Exposure Time: 95W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Species: Mouse
Route of Application: Subcutaneous
Dose: 3640 MG/KG
Exposure Time: 91W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria.
Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Species: Mouse
Route of Application: Subcutaneous
Dose: 868 MG/KG
Exposure Time: 95W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Species: Mouse
Route of Application: Subcutaneous
Dose: 2912 MG/KG
Exposure Time: 95W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Species: Mouse
Route of Application: Subcutaneous
Dose: 6616 MG/KG
Exposure Time: 95W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors

at site or application.

Species: Rat
Route of Application: Oral
Dose: 2714 MG/KG
Exposure Time: 2Y
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 400 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 300 PPM
Exposure Time: 6H/2.3Y
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Skin and Appendages: Other: Tumors.

IARC CARCINOGEN LIST

Rating: Group 2B

NTP CARCINOGEN LIST

Rating: Clear evidence.
Species: Mouse
Route: Inhalation

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 500 PPM/7H
Route of Application: Inhalation
Exposure Time: (7-16D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat
Dose: 500 PPM/7H
Route of Application: Inhalation
Exposure Time: (1-16D PREG)
Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

CHRONIC EXPOSURE - MUTAGEN
Result: Laboratory experiments have shown mutagenic effects.

Species: Human
Dose: 1850 UG/L
Cell Type: lymphocyte
Mutation test: Cytogenetic analysis

Species: Human
Dose: 25000 PPM
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Rat
Dose: 30 UMOL/L
Cell Type: liver
Mutation test: DNA damage

Species: Rat
Dose: 25 UG/L
Cell Type: liver
Mutation test: Cytogenetic analysis

Species: Rat
Route: Inhalation
Dose: 300 PPM
Exposure Time: 5D
Mutation test: Dominant lethal test

Species: Mouse
Route: Intraperitoneal
Dose: 600 MG/KG
Exposure Time: 24H
Mutation test: Micronucleus test

Species: Mouse
Dose: 160 PPM
Exposure Time: 48H
Cell Type: lymphocyte
Mutation test: specific locus test

Species: Mouse
Route: Intraperitoneal
Dose: 200 MG/KG
Mutation test: DNA damage

Species: Mouse
Route: Intraperitoneal
Dose: 349 MG/KG
Mutation test: Cytogenetic analysis

Species: Mouse
Route: Intraperitoneal
Dose: 232 MG/KG
Mutation test: Sister chromatid exchange

Species: Mouse
Dose: 400 UG/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 160 MG/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 5 MG/L
Cell Type: ovary
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 2500 UMOL/L
Cell Type: lung
Mutation test: Sister chromatid exchange

Species: Mammal
Dose: 75 MMOL/L
Cell Type: lymphocyte
Mutation test: DNA damage

Species: Mammal
Dose: 100 MMOL/TUBE
Cell Type: lymphocyte
Mutation test: DNA

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 500 PPM/7H
Route of Application: Inhalation
Exposure Time: (15D PRE/1-16D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Litter s (e.g.; # fetuses per litter; measured before birth). Effect Fertility: Other measures of fertility

Species: Rat
Dose: 47 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D MALE)
Result: Paternal Effects: Spermatogenesis (including geneti material, sperm morphology,motility, and count).

Species: Rat
Dose: 1860 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (6W MALE)
Result: Paternal Effects: Spermatogenesis (including geneti- material, sperm morphology,motility, and count). Paternal Effects: Testes, epididymis, sperm duct.

Species: Monkey
Dose: 100 PPM/7H
Route of Application: Inhalation
Exposure Time: (2Y MALE)
Result: Paternal Effects: Spermatogenesis (including geneti- material, sperm morphology,motility, and count).

12. ECOLOGICAL INFORMATION

No data available.

13. DISPOSAL CONSIDERATIONS

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

14. TRANSPORT INFORMATION

DOT
Proper Shipping Name: Propylene oxide
UN#: 1280
Class: 3
Packing Group: Packing Group I
Hazard Label: Flammable liquid
PIH: Not PIH

IATA
Proper Shipping Name: Propylene oxide
IATA UN Number: 1280
Hazard Class: 3
Packing Group: I

15. REGULATORY INFORMATION

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: F+ T
Indication of Danger: Extremely Flammable. Toxic.
R: 45 46 12 20/21/22 36/37/38
Risk Statements: May cause cancer. May cause heritable genetic damage. Extremely flammable. Harmful by inhalation, in contact with skin and if swallowed. Irritating to eyes, respiratory system and skin.
S: 53 45
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Flammable (USA) Extremely Flammable (EU). Toxic.
Risk Statements: May cause cancer. Causes burns. Harmful by inhalation, in contact with skin and if swallowed.
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
US Statements: Readily absorbed through skin. Target organ(s): Central nervous system. Calif. Prop. 65 carcinogen.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes

DEMINIMIS: 0.1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65
California Prop - 65: This product is or contains chemical(s) known to the state of California to cause cancer.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

16. OTHER INFORMATION

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Sigma-Aldrich, 3050 Spruce Street, St. Louis, MO 63103, US
phone: 314 771 5765, fax: 800 325 5052
emergency phone: 414 273 3850 Ext. 5996

Source: SAF-CDROM, valid 02/06 - 04/06

1. CHEMICAL IDENTIFICATION

Product Name	ETHYLENE OXIDE, 99.5+%
Product Number	387614
Brand	ALDRICH
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS, MO 63103 USA
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substance Name	CAS #	SARA 313
ETHYLENE OXIDE	75-21-8	Yes

Formula: C2H4O

Synonyms: Aethylenoxid (German) * Amprolene * Anprolene * Anproline * Dihydrooxirene * Dimethylene oxide * ENT -26263 * E.O. * 1,2-Epoxyaethan (German) * Epoxyethane * 1,2-Epoxyethane * Ethene oxide * Ethox * Ethyleenoxide (Dutch) * Ethylene oxide (ACGIH:OSHA) * Ethylene (oxyde d') (French) * Etilene (ossido di) (Italian) * ETO * Etylenu tlenek (Polish) * FEMA No. 2433 * Merpol * NCI-C50088 * Oxacyclopropane * Oxane * Oxidoethane * alpha,beta-Oxidoethane * Oxiraan (Dutch) * Oxiran * Oxirane * Oxirene, dihydro- * Oxyfume * Oxyfume 12 * RCRA waste number U115 * Sterilizing gas ethylene oxide 100% * T-Gas

RTECS Number: KX2450000

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Flammable (USA) Extremely Flammable (EU). Toxic.
May cause cancer. Toxic by inhalation, in contact with skin and if swallowed. May cause sensitization by skin contact.
Causes severe irritation. Reproductive hazard. Target organ(s): Lungs. Nerves.

For additional information on toxicity, please refer to Section 11.

4. FIRST-AID MEASURES

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

5. FIRE FIGHTING MEASURES

EXPLOSION HAZARDS
Forms explosive mixtures in air. Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

FLASH POINT
-4 °F -20 °C Method: closed cup

EXPLOSION LIMITS
Lower: 3 % Upper: 99.9 %

AUTOIGNITION TEMP
429 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Use water spray to cool fire-exposed containers.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Vapor may travel considerable distance to source of ignition and flash back. Emits toxic fumes under fire conditions.

EXPOSURE HAZARD(S)
Material: Toxic. Sensitizer. Severe irritant.

6. ACCIDENTAL RELEASE MEASURES

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area and keep personnel upwind. Shut off all sources of ignition. Shut off leak if there is no risk. Use nonsparking tools.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

ADDITIONAL INFORMATION (E.G. REFER TO INFORMATION UNDER OTHER HEADINGS)
Ventilate the spill site thoroughly before reentering.

7. HANDLING AND STORAGE

HANDLING
User Exposure: Do not breathe vapor. Avoid all contact. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed. Keep away from heat, sparks, and open flame. Store in a cool dry place.
Store at 2-8°C

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS
Use nonsparking tools. Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Discard contaminated clothing and shoes. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	1 PPM
USA	MSHA Standard-air	TWA	50 PPM (90 MG/M3)
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	0.1 PPM
		Ceiling	co5 PPM/10M

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1 MG/M3
Poland		NDSCh	3 MG/M3
Poland		NDSP	-

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance N/A

Property	Value	At Temperature or Pressure
Molecular Weight	44.05 AMU	
pH	N/A	
BP/BP Range	10.7 °C	760 mmHg
MP/MP Range	-111 °C	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	1.52 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.882 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	< 0.04 %	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	-4 °F -20 °C	Method: closed cup
Explosion Limits	Lower: 3 %	
	Upper: 99.9 %	
Flammability	N/A	
Autoignition Temp	429 °C	
Refractive Index	1.3597	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

10. STABILITY AND REACTIVITY

STABILITY
Reactions to Avoid: Reacts violently with:
Materials to Avoid: Alcohols, Alkali metals, Ammonia, Oxidizing agents, Chemically active metals, and their salts.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

11. TOXICOLOGICAL INFORMATION

cancer hazard

ROUTE OF EXPOSURE
Multiple Routes: Harmful if swallowed, inhaled, or absorbed through skin. High concentrations are extremely destructive to tissues of the mucous membranes and upper respiratory tract, eyes, and skin.

SENSITIZATION
Skin: May cause allergic skin reaction.

TARGET ORGAN(S) OR SYSTEM(S)
Nerves. Lungs.

SIGNS AND SYMPTOMS OF EXPOSURE

Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure to large amounts can cause: Convulsions.

TOXICITY DATA

Oral
Rat
72 mg/kg
LD50

Inhalation
Rat
800 ppm
LC50
Remarks: Lungs, Thorax, or Respiration:Other changes.
Liver:Other changes. Kidney, Ureter, Bladder:Other changes.

Subcutaneous
Rat
187 MG/KG
LD50

Inhalation
Mouse
836 ppm
LC50

Intraperitoneal
Mouse
175 MG/KG
LD50

Intravenous
Mouse
290 MG/KG
LD50

Inhalation
Dog
960 ppm
LC50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Gastrointestinal:Nausea or vomiting. Gastrointestinal:Hypermotility, diarrhea.

Intravenous
Dog
330 MG/KG
LD50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Behavioral:Convulsions or effect on seizure threshold. Gastrointestinal:Nausea or vomiting.

Oral
Guinea pig
270 mg/kg
LD50

Inhalation
Guinea pig
1,500 mg/m3

LC50

IRRITATION DATA

Skin
Human
1 %
7S

Eyes
Rabbit
18 mg
6H
Remarks: Moderate irritation effect

CHRONIC EXPOSURE - CARCINOGEN
Result: Carcinogen.

Species: Rat
Route of Application: Oral
Dose: 1186 MG/KG
Exposure Time: 2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Gastrointestinal:Tumors. Liver:Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 33 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Brain and Coverings:Tumors. Blood:Leukemia

Species: Mouse
Route of Application: Inhalation
Dose: 50 PPM
Result: Tumorigenic:Carcinogenic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Species: Mouse
Route of Application: Subcutaneous
Dose: 292 MG/KG
Exposure Time: 95W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Species: Mouse
Route of Application: Subcutaneous
Dose: 1090 MG/KG
Exposure Time: 91W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors at site or application.

Species: Mouse
Route of Application: Subcutaneous
Dose: 908 MG/KG
Exposure Time: 95W

Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors
at site or application.

Species: Mouse
Route of Application: Subcutaneous
Dose: 2576 MG/KG
Exposure Time: 95W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Blood:Lymphomas including Hodgkin's disease. Tumorigenic:Tumors
at site or application.

Species: Rat
Route of Application: Oral
Dose: 5112 MG/KG
Exposure Time: 2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Gastrointestinal:Tumors. Liver:Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 50 PPM
Exposure Time: 7H/2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Blood:Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 33 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS
criteria. Brain and Coverings:Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 33 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Brain and
Coverings:Tumors.

OSHA CARCINOGEN LIST

cancer hazard

IARC CARCINOGEN LIST

Rating: Group 1

NTP CARCINOGEN LIST

Rating: Clear evidence.
Species: Mouse
Route: Inhalation

ACGIH CARCINOGEN LIST

Rating: A2

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 100 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 150 PPM/7H
Route of Application: Inhalation
Exposure Time: (7-16D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Craniofacial (including nose and tongue). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 255 PPM/6H
Route of Application: Inhalation
Exposure Time: (10D MALE)
Result: Effects on Embryo or Fetus: Fetal death.

Species: Mouse
Dose: 2700 PPM/6H
Route of Application: Inhalation
Exposure Time: (7D PREG)
Result: Effects on Embryo or Fetus: Other effects to embryo.

Species: Mouse
Dose: 150 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D MALE)
Result: Effects on Embryo or Fetus: Fetal death.

Species: Mouse
Dose: 125 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Other developmental abnormalities.

Species: Mouse
Dose: 450 MG/KG
Route of Application: Intravenous
Exposure Time: (8-10D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 5 MMOL/L
Cell Type: fibroblast
Mutation test: DNA damage

Species: Human
Dose: 4 MMOL/L
Cell Type: leukocyte

Mutation test: Unscheduled DNA synthesis

Species: Human
Route: Inhalation
Dose: 5 PPM
Exposure Time: Y
Mutation test: Cytogenetic analysis

Species: Human
Dose: 4 PPH
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Human
Dose: 36 PPM
Exposure Time: 24H
Cell Type: fibroblast
Mutation test: Sister chromatid exchange

Species: Human
Dose: 10 MG/L
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Human
Route: Inhalation
Dose: 380 PPB/6H/4Y-I
Mutation test: Sister chromatid exchange

Species: Human
Route: Inhalation
Dose: 60 PPM
Exposure Time: 12W
Mutation test: Sister chromatid exchange

Species: Human
Dose: 5 MMOL/L
Cell Type: fibroblast
Mutation test: Mutation in mammalian somatic cells.

Species: Rat
Route: Intravenous
Dose: 200 MG/KG
Mutation test: Micronucleus test

Species: Rat
Route: Inhalation
Dose: 200 PPM
Exposure Time: 6H/4W
Mutation test: Micronucleus test

Species: Rat
Dose: 30 UG/L
Exposure Time: 2D
Cell Type: Bone marrow
Mutation test: Cytogenetic analysis

Species: Rat
Route: Inhalation
Dose: 1 UG/L
Exposure Time: 17W
Mutation test: Cytogenetic analysis

Species: Rat
Route: Oral
Dose: 9 MG/KG
Mutation test: Cytogenetic analysis

Species: Rat
Route: Inhalation
Dose: 50 PPM
Exposure Time: 6H/3D
Mutation test: Sister chromatid exchange

Species: Rat
Route: Inhalation
Dose: 1000 PPM
Exposure Time: 4H
Mutation test: Dominant lethal test

Species: Rat
Route: Subcutaneous
Dose: 40 MG/KG
Mutation test: Dominant lethal test

Species: Mouse
Route: Intraperitoneal
Dose: 150 MG/KG
Mutation test: Micronucleus test

Species: Mouse
Route: Intravenous
Dose: 200 MG/KG
Mutation test: Micronucleus test

Species: Mouse
Route: Inhalation
Dose: 380 PPM
Exposure Time: 3H
Mutation test: Micronucleus test

Species: Mouse
Dose: 2500 UMOL/L
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Mouse
Route: Intraperitoneal
Dose: 100 MG/KG
Mutation test: DNA damage

Species: Mouse
Route: Inhalation
Dose: 1800 PPM
Exposure Time: 1H
Mutation test: DNA damage

Species: Mouse
Route: Inhalation
Dose: 300 PPM
Mutation test: Unscheduled DNA synthesis

Species: Mouse
Route: Inhalation

Dose: 400 PPM
Exposure Time: 6H
Mutation test: Cytogenetic analysis

Species: Mouse
Route: Intraperitoneal
Dose: 88120 UG/KG
Mutation test: Cytogenetic analysis

Species: Mouse
Route: Intraperitoneal
Dose: 88120 UG/KG
Mutation test: Sister chromatid exchange

Species: Mouse
Route: Inhalation
Dose: 204 PPM
Exposure Time: 6H/48D
Mutation test: Dominant lethal test

Species: Mouse
Route: Intraperitoneal
Dose: 150 MG/KG
Mutation test: Dominant lethal test

Species: Mouse
Route: Intraperitoneal
Dose: 200 MG/KG
Exposure Time: 3D
Mutation test: Mutation in mammalian somatic cells.

Species: Mouse
Dose: 5 UMOL/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Mouse
Route: Inhalation
Dose: 200 PPM
Exposure Time: 6H/4W
Mutation test: Mutation in mammalian somatic cells.

Species: Mouse
Route: Intraperitoneal
Dose: 30 MG/KG
Exposure Time: 25D
Mutation test: Heritable translocation test

Species: Mouse
Route: Inhalation
Dose: 165 PPM
Exposure Time: 6H/48D
Mutation test: Heritable translocation test

Species: Hamster
Dose: 625 PPM
Exposure Time: 2H
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Hamster
Dose: 250 PPM

Cell Type: fibroblast
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 5 MG/L
Exposure Time: 1H
Cell Type: ovary
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 7500 PPM
Exposure Time: 2H
Cell Type: lung
Mutation test: Mutation in mammalian somatic cells.

Species: Monkey
Route: Inhalation
Dose: 100 PPM
Exposure Time: 7H/2Y
Mutation test: Cytogenetic analysis

Species: Monkey
Route: Inhalation
Dose: 50 PPM
Exposure Time: 7H/2Y
Mutation test: Sister chromatid exchange

Species: Rabbit
Route: Inhalation
Dose: 50 PPM
Exposure Time: 12W
Mutation test: Sister chromatid exchange

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: May cause reproductive disorders.

Species: Rat
Dose: 50 PPM/6H
Route of Application: Inhalation
Exposure Time: (91D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Species: Rat
Dose: 100 PPM/6H
Route of Application: Inhalation
Exposure Time: (12W MALE/9W PRE-3W PREG)
Result: Effects on Newborn: Live birth index (# fetuses per litter; measured after birth).

Species: Rat
Dose: 3600 UG/M3/24H
Route of Application: Inhalation
Exposure Time: (60D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct.
Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Rat
Dose: 100 PPM/6H
Route of Application: Inhalation

Exposure Time: (12W PRE-21D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Newborn: Live birth index (# fetuses per litter; measured after birth).

Species: Mouse
Dose: 1200 PPM/90M
Route of Application: Inhalation
Exposure Time: (1D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetal death. Specific Developmental Abnormalities: Homeostasis

Species: Mouse
Dose: 1200 PPM/90M
Route of Application: Inhalation
Exposure Time: (1D PRE)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetal death. Effects on Embryo or Fetus: Other effects to embryo.

Species: Mouse
Dose: 750 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (25D MALE)
Result: Effects on Newborn: Live birth index (# fetuses per litter; measured after birth). Effects on Newborn: Delayed effects.

Species: Mouse
Dose: 125 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Specific Developmental Abnormalities: Eye, ear.

Species: Mouse
Dose: 225 MG/KG
Route of Application: Intravenous
Exposure Time: (10-12D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Mouse
Dose: 450 MG/KG
Route of Application: Intravenous
Exposure Time: (10-12D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Monkey
Dose: 50 PPM/7H
Route of Application: Inhalation
Exposure Time: (96W MALE)
Result: Paternal Effects: Spermatogenesis (including genetic

material, sperm morphology,motility, and count).

Species: Monkey
Dose: 50 PPM/7H
Route of Application: Inhalation
Exposure Time: (2Y MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Species: Rabbit
Dose: 324 MG/KG
Route of Application: Intravenous
Exposure Time: (6-14D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

12. ECOLOGICAL INFORMATION

No data available.

13. DISPOSAL CONSIDERATIONS

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

14. TRANSPORT INFORMATION

IATA
Proper Shipping Name: Ethylene oxide
IATA UN Number: 1040
Hazard Class: 2.3
Not Allowed - Aircraft: Cargo aircraft only. Not permitted on passenger aircraft.

15. REGULATORY INFORMATION

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: F+ T
Indication of Danger: Extremely Flammable. Toxic.
R: 45 46 12 23 36/37/38
Risk Statements: May cause cancer. May cause heritable genetic damage. Extremely flammable. Also toxic by inhalation. Irritating to eyes, respiratory system and skin.
S: 53 45
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Flammable (USA) Extremely Flammable (EU). Toxic.
Risk Statements: May cause cancer. Toxic by inhalation, in contact with skin and if swallowed. May cause sensitization by skin contact.

Safety Statements: Avoid exposure - obtain special instructions before use. Keep away from sources of ignition - no smoking. Do not breathe vapor. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
US Statements: Causes severe irritation. Reproductive hazard.
Target organ(s): Lungs. Nerves.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
DEMINIMIS: 0.1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65
California Prop - 65: California Proposition 65: This product is or contains chemical(s) known to the state of California to cause developmental toxicity. This product is or contains chemical(s) known to the state of California to cause female reproductive toxicity. California Proposition 65: This product is or contains chemical(s) known to the state of California to cause developmental toxicity. This product is or contains chemical(s) known to the state of California to cause female reproductive toxicity.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

16. OTHER INFORMATION

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

24-Hour Emergency Phone Number: 989-636-4400

Product: VORANOL* 270 POLYOL

Product Code: 02365

Effective Date: 03/16/01 Date Printed: 12/17/01 MSD: 005128

The Dow Chemical Company, Midland, MI 48674

Customer Information Center: 800-258-2436

2. COMPOSITION/INFORMATION ON INGREDIENTS

Polyether polyol CAS# 025791-96-2 >99%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

```
**********************************************************************
* Colorless viscous liquid.  Slight sweet odor.  No significant      *
* immediate hazards for emergency response are known.                *
*                                                                    *
**********************************************************************
```

POTENTIAL HEALTH EFFECTS (See Section 11 for toxicological data.)

EYE: May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

SKIN: Essentially nonirritating to skin. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

INGESTION: Single dose oral toxicity is considered to be low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury.

INHALATION: At room temperature, vapors are minimal due to physical properties; a single exposure is not likely to be hazardous. If material is heated or mist produced, concentrations may be attained that are sufficient to cause

(Continued on page 2 , over)

respiratory irritation.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

4. FIRST AID

EYE: Flush eyes with plenty of water.

SKIN: Wash off in flowing water or shower.

INGESTION: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES
FLASH POINT: >350F, >177C
METHOD USED: PMCC, ASTM D-93
AUTOIGNITION TEMPERATURE: Not determined.

FLAMMABILITY LIMITS
LFL: Not determined.
UFL: Not determined.

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds.

OTHER FLAMMABILITY INFORMATION: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

EXTINGUISHING MEDIA: Water fog or fine spray. Carbon dioxide, dry chemical, foam. Alcohol resistant foams (ATC type) pre-

(Continued on page 3)

ferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Do not use direct water stream. May spread fire.

FIRE FIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Do not use direct water stream. May spread fire.

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES (See Section 15 for Regulatory Information)

PROTECT PEOPLE: Isolate area. May be a slipping hazard.

PROTECT THE ENVIRONMENT: Contain liquid to prevent contamination of soil, surface water or ground water.

CLEANUP: Contain spill if possible.

7. HANDLING AND STORAGE

HANDLING: Product on surfaces can cause slippery conditions. Product shipped/handled hot can cause thermal burns. Product handled hot may require additional ventilation or local exhaust.

STORAGE: Keep containers tightly closed when not in use. Store in stainless steel, polypropylene, polyethylene lined containers, Teflon, glass-lined container, aluminum, Plasite 3066 lined containers, Plasite 3070 lined containers, or 316 stainless steel.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

PERSONAL PROTECTIVE EQUIPMENT
EYE/FACE PROTECTION: Use safety glasses.

(Continued on page 4 , over)

SKIN PROTECTION: No precautions other than clean body-covering clothing should be needed. Use gloves with insulation for thermal protection, when needed.

RESPIRATORY PROTECTION: For most conditions, no respiratory protection should be needed; however, if material is heated or sprayed, use an approved air-purifying respirator.

EXPOSURE GUIDELINES: None established.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless viscous liquid.
ODOR: Slight sweet odor.
VAPOR PRESSURE: Low.
VAPOR DENSITY: > Air.
BOILING POINT: Decomposes before boiling.
SOLUBILITY IN WATER: Soluble to slightly soluble at room temperature.
SPECIFIC GRAVITY: > 1.00 @ 25/25C, see Physical Properties Sheet or call Customer Information Center, 800-258-2436.

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable under recommended storage conditions. See storage section.

CONDITIONS TO AVOID: Product can oxidize at elevated temperatures. Product can decompose at elevated temperatures.

INCOMPATIBILITY WITH OTHER MATERIALS: Avoid contact with oxidizing materials. Avoid unintended contact with isocyanates. The reaction of polyols and isocyanates generates heat. Avoid contact with strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products depend upon temperature, air supply, and the presence of other materials. Hazardous decomposition products may include and are not limited to: aldehydes, ketones, organic acids and polymer fragments.

HAZARDOUS POLYMERIZATION: Will not occur by itself.

11. TOXICOLOGICAL INFORMATION (See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1)

(Continued on page 5)

SKIN: For this family of materials, the dermal LD50 in rats is typically >2000 mg/kg.

INGESTION: For this family of materials, the oral LD50 in rats is typically between 1000 and 2000 mg/kg.

12. ECOLOGICAL INFORMATION (For detailed Ecological data, write or call the address or non-emergency number shown in Section 1)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Based largely or completely on information for similar material. Bioconcentration potential is low (BCF less than 100 or Log Pow less than 3).

DEGRADATION & PERSISTENCE: Based largely or completely on information for similar material. Based on the stringent test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

ECOTOXICITY: Based largely or completely on information for similar material. Material is practically non-toxic to aquatic organisms on an acute basis (LC50 greater than 100 mg/L in most sensitive species).

13. DISPOSAL CONSIDERATIONS (See Section 15 for Regulatory Information)

DISPOSAL: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. THE DOW CHEMICAL COMPANY HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION 2 (Composition/Information On Ingredients).

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: recycler, reclaimer, incinerator or other thermal destruction device.

(Continued on page 6 , over)

Product: VORANOL* 270 POLYOL
Product Code: 02365

Effective Date: 03/16/01 Date Printed: 12/17/01 MSD: 005128

As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Center at 800-258-2436 or 517-832-1556 for further details.

14. TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (D.O.T.):
This product is not regulated by D.O.T. when shipped domestically by land.

CANADIAN TDG INFORMATION:
This product is not regulated by TDG when shipped domestically by land.

15. REGULATORY INFORMATION (Not meant to be all-inclusive--selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

U.S. REGULATIONS
==========

SARA 313 INFORMATION: To the best of our knowledge, this product contains no chemical subject to SARA Title III Section 313 supplier notification requirements.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

(Continued on page 7)

REGULATORY INFORMATION (CONTINUED)

Not to have met any hazard category

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

The CAS number(s) for TSCA is(are):
CAS# 025791-96-2

STATE RIGHT-TO-KNOW: This product is not known to contain any substances subject to the disclosure requirements of

New Jersey
Pennsylvania

OSHA HAZARD COMMUNICATION STANDARD:

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND):

To the best of our knowledge, this product contains no chemical subject to reporting under CERCLA.

CANADIAN REGULATIONS
==========

WHMIS INFORMATION: The Canadian Workplace Hazardous Materials Information System (WHMIS) Classification for this product is:

This product is not a "Controlled Product" under WHMIS.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):

(Continued on page 8 , over)

Product: VORANOL* 270 POLYOL
Product Code: 02365

Effective Date: 03/16/01 Date Printed: 12/17/01 MSD: 005128

REGULATORY INFORMATION (CONTINUED)

All substances in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. OTHER INFORMATION

The reaction of polyols and isocyanates generate heat. Contact of the reacting materials with skin or eyes can cause severe burns and may be difficult to remove from the affected areas. Immediately wash affected areas with plenty of water and seek medical assistance.

HAZARD RATING SYSTEM:

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

Health	1
Flammability	1
Reactivity	0

MSDS STATUS: Revised Section 15, Canadian Regulations.

Material Safety Data Sheet

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

24-Hour Emergency Phone Number: 989-636-4400

Product: VORANOL* 230-056 POLYOL

Product Code: 07523

Effective Date: 03/16/01 Date Printed: 12/17/01 MSD: 001080

The Dow Chemical Company, Midland, MI 48674

Customer Information Center: 800-258-2436

2. COMPOSITION/INFORMATION ON INGREDIENTS

Polyether polyol CAS# 025791-96-2 >99%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

```
**********************************************************************
* Colorless viscous liquid.  Slight sweet odor.  No significant      *
* immediate hazards for emergency response are known.                *
*                                                                    *
**********************************************************************
```

POTENTIAL HEALTH EFFECTS (See Section 11 for toxicological data.)

EYE: May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

SKIN: Prolonged contact is essentially nonirritating to skin. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

INGESTION: Single dose oral toxicity is considered to be low. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury.

INHALATION: At room temperature, vapors are minimal due to physical properties; a single exposure is not likely to be hazardous. If material is heated or mist produced, concentrations may be attained that are sufficient to cause

(Continued on page 2 , over)

respiratory irritation.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

4. FIRST AID

EYE: Flush eyes with plenty of water.

SKIN: Wash off in flowing water or shower.

INGESTION: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES
FLASH POINT: >350F, >177C
METHOD USED: PMCC, ASTM D-93
AUTOIGNITION TEMPERATURE: Not determined.

FLAMMABILITY LIMITS
LFL: Not determined
UFL: Not determined

HAZARDOUS COMBUSTION PRODUCTS: During a fire, smoke may contain the original material in addition to unidentified toxic and/or irritating compounds.

OTHER FLAMMABILITY INFORMATION: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Spills of these organic liquids on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

EXTINGUISHING MEDIA: Water fog or fine spray. Carbon dioxide, dry chemical, foam. Alcohol resistant foams (ATC type) pre-

(Continued on page 3)

ferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Do not use direct water stream. May spread fire.

FIRE FIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire.

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES (See Section 15 for Regulatory Information)

PROTECT PEOPLE: Isolate area. May be a slipping hazard.

PROTECT THE ENVIRONMENT: Contain liquid to prevent contamination of soil, surface water or ground water.

CLEANUP: Contain spill if possible.

7. HANDLING AND STORAGE

HANDLING: Product on surfaces can cause slippery conditions. Product shipped/handled hot can cause thermal burns. Product handled hot may require additional ventilation or local exhaust.

STORAGE: Keep containers tightly closed when not in use. Store in stainless steel, polypropylene, polyethylene lined containers, Teflon, glass-lined container, aluminum, Plasite 3066 lined containers, Plasite 3070 lined containers, or 316 stainless steel.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

PERSONAL PROTECTIVE EQUIPMENT
EYE/FACE PROTECTION: Use safety glasses.

(Continued on page 4 , over)

SKIN PROTECTION: No precautions other than clean body-covering clothing should be needed. Use gloves with insulation for thermal protection, when needed.

RESPIRATORY PROTECTION: For most conditions, no respiratory protection should be needed; however, if material is heated or sprayed, use an approved air-purifying respirator.

EXPOSURE GUIDELINES: None established.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless viscous liquid.
ODOR: Slight sweet odor.
VAPOR PRESSURE: Low.
VAPOR DENSITY: > Air.
BOILING POINT: Decomposes before boiling.
SOLUBILITY IN WATER: Insoluble.
SPECIFIC GRAVITY: > 1.00 @ 25/25C, see Physical Properties Sheet or call Customer Information Center, 800-258-2436.

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable under recommended storage conditions. See storage section.

CONDITIONS TO AVOID: Product can oxidize at elevated temperatures. Product can decompose at elevated temperatures.

INCOMPATIBILITY WITH OTHER MATERIALS: Avoid contact with oxidizing materials. Avoid unintended contact with isocyanates. The reaction of polyols and isocyanates generates heat. Avoid contact with strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products depend upon temperature, air supply, and the presence of other materials. Hazardous decomposition products may include and are not limited to: aldehydes, ketones, organic acids and polymer fragments.

HAZARDOUS POLYMERIZATION: Will not occur by itself.

11. TOXICOLOGICAL INFORMATION (See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1)

(Continued on page 5)

SKIN: For this family of materials, the dermal LD50 in rabbits is typically >2000 mg/kg.

INGESTION: For this family of materials, the oral LD50 in rats is typically >2000 mg/kg.

12. ECOLOGICAL INFORMATION (For detailed Ecological data, write or call the address or non-emergency number shown in Section 1)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: No bioconcentration is expected because of the relatively high molecular weight (MW greater than 1000).

DEGRADATION & PERSISTENCE: No relevant information found.

ECOTOXICITY: Based largely or completely on information for similar materials. Material is practically non-toxic to aquatic organisms on an acute basis (LC50 greater than 100 mg/L in most sensitive species).

13. DISPOSAL CONSIDERATIONS (See Section 15 for Regulatory Information)

DISPOSAL: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. THE DOW CHEMICAL COMPANY HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION 2 (Composition/Information On Ingredients).

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: recycler, reclaimer, incinerator or other thermal destruction device.

As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Center at

(Continued on page 6 , over)

800-258-2436 or 517-832-1556 for further details.

14. TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (D.O.T.):
This product is not regulated by D.O.T. when shipped domestically by land.

15. REGULATORY INFORMATION (Not meant to be all-inclusive--selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

U.S. REGULATIONS
==========

SARA 313 INFORMATION: To the best of our knowledge, this product contains no chemical subject to SARA Title III Section 313 supplier notification requirements.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Not to have met any hazard category

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

(Continued on page 7)

REGULATORY INFORMATION (CONTINUED)

The CAS number(s) for TSCA is(are):
CAS# 025791-96-2

STATE RIGHT-TO-KNOW: This product is not known to contain any substances subject to the disclosure requirements of

New Jersey
Pennsylvania

OSHA HAZARD COMMUNICATION STANDARD:

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND):

To the best of our knowledge, this product contains no chemical subject to reporting under CERCLA.

CANADIAN REGULATIONS
==========

WHMIS INFORMATION: The Canadian Workplace Hazardous Materials Information System (WHMIS) Classification for this product is:

This product is not a "Controlled Product" under WHMIS.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):

All substances in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. OTHER INFORMATION

(Continued on page 8 , over)

Product: VORANOL* 230-056 POLYOL
Product Code: 07523

Effective Date: 03/16/01 Date Printed: 12/17/01 MSD: 001080

The reaction of polyols and isocyanates generate heat. Contact of the reacting materials with skin or eyes can cause severe burns and may be difficult to remove from the affected areas. Immediately wash affected areas with plenty of water and seek medical assistance.

HAZARD RATING SYSTEM:

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

Health	1
Flammability	1
Reactivity	0

MSDS STATUS: Revised Section 15, Canadian Regulations.

MATERIAL SAFETY DATA SHEET

Bayer MaterialScience

Bayer MaterialScience LLC
Product Safety & Regulatory Affairs
100 Bayer Road
Pittsburgh, PA 15205-9741
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Bayer Emergency Phone:	(412) 923-1800
Bayer Information Phone:	(800) 662-2927

1. Product and Company Identification

Product Name:	MULTRANOL 3900
Material Number:	3001826
Chemical Family:	Polyether Polyol
Chemical Name:	Poly (Oxyalkylene) Polymer
CAS-No.:	9082-00-2

2. Hazards Identification

Emergency Overview

Color: Colorless **Form:** liquid **Odor:** slight.
Product poses little or no hazard if spilled. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Irritating gases/fumes may be given off during burning or thermal decomposition.

Potential Health Effects

Primary Routes of Entry: Skin Contact, Eye Contact

Medical Conditions Aggravated by Exposure: None known.

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

General Effects of Exposure
Acute Effects of Exposure
For Product: MULTRANOL 3900
Not expected to cause any adverse acute health effects.

Chronic Effects of Exposure
For Product: MULTRANOL 3900
Not expected to cause any adverse chronic health effects.

Carcinogenicity:
No Carcinogenic substances as defined by IARC, NTP and/or OSHA

3. Composition/Information on Ingredients

Hazardous Components
This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

4. First Aid Measures

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
In case of skin contact, wash affected areas with soap and water. Thoroughly clean shoes before reuse. Wash clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation
If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if irritation develops.

Ingestion
If ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

5. Fire-Fighting Measures

Suitable Extinguishing Media: carbon dioxide (CO2), dry chemical, foam, water spray for large fires.

Special Fire Fighting Procedures
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Use cold water spray to cool fire-exposed containers to minimize risk of rupture. Toxic and irritating gases/fumes may be given off during burning or thermal decomposition.

6. Accidental release measures

Spill and Leak Procedures
Dike or dam spilled material and control further spillage, if possible. Cover spill with inert material (e. g., dry sand or earth) and collect for proper disposal. Collect and place in appropriately marked sealable containers for disposal. Wash spill area with soap and water.

7. Handling and Storage

Storage Temperature:
maximum: 50 °C (122 °F)

Storage Period
36 Months

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Keep container closed when not in use. Material is hygroscopic and may absorb small amounts of atmospheric moisture. If contamination with isocyanates is suspected, do not reseal containers. Avoid inhalation of vapour or mist.

Further Info on Storage Conditions
Material can be stored safely at ambient temperatures.

8. Exposure Controls / Personal Protection

Country specific exposure limits have not been established or are not applicable

Industrial Hygiene/Ventilation Measures
Under normal conditions of use, special ventilation is not required.

Respiratory Protection
None required under normal conditions of use., NIOSH approved air-supplied respirator during die cleaning, high temperature processing or when thermal decomposition is suspected.

Hand Protection
Permeation resistant gloves., Butyl rubber gloves., Nitrile rubber gloves., Neoprene gloves

Eye Protection
safety glasses with side-shields.

Skin and body protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product.

9. Physical and chemical properties

Form:	liquid
Color:	Colorless
Odor:	slight
pH:	6 - 7.5
Freezing Point:	Not Established
Boiling Point/Range:	Not Established
Flash Point:	184 °C (363.2 °F) (Pensky-Martens Closed Cup (ASTM D-93))
Vapor Pressure:	Not Established
Specific Gravity:	1.02 @ 25 °C (77 °F)
Solubility in Water:	completely soluble
Viscosity, Dynamic:	780 - 890 mPa.s @ 25 °C (77 °F)
Bulk Density:	8.56 lb/gal
Molecular Weight:	4,800
Hygroscopicity:	hygroscopic

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerization does not occur.

Stability
Stable

Materials to avoid
oxidizing agents, Isocyanates

Hazardous decomposition products
By Fire and Thermal Decomposition: Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke, Other undetermined compounds

11. Toxicological Information

No information available.

12. Ecological Information

No information available.

13. Disposal considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Empty Container Precautions
Recondition or dispose of empty container in accordance with governmental regulations. Empty containers retain product residue; observe all precautions for product. Do not heat or cut container with electric or gas torch.

14. Transportation information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations

OSHA Hazcom Standard Rating: Non-Hazardous

US. Toxic Substances Control Act: Listed on the TSCA Inventory.

US. EPA CERCLA Hazardous Substances (40 CFR 302):
Components
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A):
Components
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required:
Components
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

State Right-To-Know Information
The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight %	Components	CAS-No.
99 - 100%	Polyether Polyol	9082-00-2

Weight %	Components	CAS-No.
>=1%	Polyether Polyol	9082-00-2

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

16. Other Information

NFPA 704M Rating

Health	0
Flammability	1
Reactivity	0
Other	

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

HMIS Rating

Health	0
Flammability	1
Physical Hazard	0

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe
* = Chronic Health Hazard

The method of hazard communication for Bayer MaterialScience LLC is comprised of Product Labels and Material Safety Data Sheets. HMIS and NFPA ratings are provided by Bayer MaterialScience LLC as a customer service.

Contact Person:	Product Safety Department
Telephone:	(412) 777-2835
MSDS Number:	R300053
Version Date:	01/24/2006
Report Version:	1.8

MATERIAL SAFETY DATA SHEET

Bayer MaterialScience

Bayer MaterialScience LLC
Product Safety & Regulatory Affairs
100 Bayer Road
Pittsburgh, PA 15205-9741
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC:	(800) 424-9300
INTERNATIONAL:	(703) 527-3887

NON-TRANSPORTATION

Bayer Emergency Phone:	(412) 923-1800
Bayer Information Phone:	(800) 662-2927

1. Product and Company Identification

Product Name:	MULTRANOL 3600
Material Number:	1677474
Chemical Family:	Polyether Polyol
Chemical Name:	Poly (Oxyalkylene) Polymer
CAS-No.:	25322-69-4

2. Hazards Identification

Emergency Overview

Color: Colorless **Form:** liquid **Odor:** slight.
Product poses little or no hazard if spilled. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Irritating gases/fumes may be given off during burning or thermal decomposition.

Potential Health Effects

Primary Routes of Entry: Skin Contact, Eye Contact

Medical Conditions Aggravated by Exposure: None known.

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

General Effects of Exposure
Acute Effects of Exposure
For Product: MULTRANOL 3600
Not expected to cause any adverse acute health effects.

Chronic Effects of Exposure
For Product: MULTRANOL 3600
Not expected to cause any adverse chronic health effects.

Carcinogenicity:
No Carcinogenic substances as defined by IARC, NTP and/or OSHA

3. Composition/Information on Ingredients

Hazardous Components
This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

4. First Aid Measures

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
In case of skin contact, wash affected areas with soap and water. Thoroughly clean shoes before reuse. Wash clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation
If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if irritation develops.

Ingestion
If ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

5. Fire-Fighting Measures

Suitable Extinguishing Media: carbon dioxide (CO2), dry chemical, foam, water spray for large fires.

Special Fire Fighting Procedures
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Use cold water spray to cool fire-exposed containers to minimize risk of rupture. Toxic and irritating gases/fumes may be given off during burning or thermal decomposition.

6. Accidental release measures

Spill and Leak Procedures
Dike or dam spilled material and control further spillage, if possible. Cover spill with inert material (e. g., dry sand or earth) and collect for proper disposal. Collect and place in appropriately marked sealable containers for disposal. Wash spill area with soap and water.

7. Handling and Storage

Storage Temperature:
maximum: 50 °C (122 °F)

Storage Period
36 Months

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Keep container closed when not in use. Material is hygroscopic and may absorb small amounts of atmospheric moisture. If contamination with isocyanates is suspected, do not reseal containers. Avoid inhalation of vapour or mist.

Further Info on Storage Conditions
Material can be stored safely at ambient temperatures.

8. Exposure Controls / Personal Protection

Country specific exposure limits have not been established or are not applicable

Industrial Hygiene/Ventilation Measures
Under normal conditions of use, special ventilation is not required.

Respiratory Protection
None required under normal conditions of use., NIOSH approved air-supplied respirator during die cleaning, high temperature processing or when thermal decomposition is suspected.

Hand Protection
Permeation resistant gloves., Butyl rubber gloves., Nitrile rubber gloves., Neoprene gloves

Eye Protection
safety glasses with side-shields.

Skin and body protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product.

9. Physical and chemical properties

Form:	liquid
Color:	Colorless
Odor:	slight
pH:	Not Established
Freezing Point:	Not Established
Boiling Point/Range:	Not Established
Flash Point:	> 93.33 °C (> 200 °F)
Vapor Pressure:	Not Established
Specific Gravity:	1.02 @ 25 °C (77 °F)
Solubility in Water:	completely soluble
Bulk Density:	8.51 lb/gal
Molecular Weight:	2,000
Hygroscopicity:	hygroscopic

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerization does not occur.

Stability
Stable

Materials to avoid
oxidizing agents, Isocyanates

Hazardous decomposition products
By Fire and Thermal Decomposition: Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke, Other undetermined compounds

11. Toxicological Information

No information available.

12. Ecological Information

No information available.

13. Disposal considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Empty Container Precautions
Recondition or dispose of empty container in accordance with governmental regulations. Empty containers retain product residue; observe all precautions for product. Do not heat or cut container with electric or gas torch.

14. Transportation information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations

OSHA Hazcom Standard Rating: Non-Hazardous

US. Toxic Substances Control Act: Listed on the TSCA Inventory.

US. EPA CERCLA Hazardous Substances (40 CFR 302):
Components
None

SARA Section 311/312 Hazard Categories:
Non-hazardous under Section 311/312

**US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SA
Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A):**
Components
None

**US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SA
Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required:**
Components
None

**US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Ha
and Appendix VIII Hazardous Constituents (40 CFR 261):**
If discarded in its purchased form, this product would not be a hazardous waste either b
characteristic. However, under RCRA, it is the responsibility of the product user to det
of disposal, whether a material containing the product or derived from the product shou
hazardous waste. (40 CFR 261.20-24)

State Right-To-Know Information
The following chemicals are specifically listed by individual states; other product speci
data in other sections of the MSDS may also be applicable for state requirements. For c
regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight %	Components	CAS-No.
99 - 100%	Polyether Polyol	25322-69-4

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, California has found to cause cancer, birth defects or other reproductive harm.

16. Other Information

NFPA 704M Rating

Health	0
Flammability	1
Reactivity	0
Other	

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

HMIS Rating

Health	0
Flammability	1
Physical Hazard	0

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe
* = Chronic Health Hazard

The method of hazard communication for Bayer MaterialScience LLC is comprised of Product Labels and Material Safety Data Sheets. HMIS and NFPA ratings are provided by Bayer MaterialScience LLC as a customer service.

Contact Person:	Product Safety Department
Telephone:	(412) 777-2835
MSDS Number:	R300033
Version Date:	11/08/2005
Report Version:	1.8

MATERIAL SAFETY DATA SHEET

Bayer MaterialScience

Bayer MaterialScience LLC
Product Safety & Regulatory Affairs
100 Bayer Road
Pittsburgh, PA 15205-9741
USA

TRANSPORTATION EMERGENCY
CALL CHEMTREC: (800) 424-9300
INTERNATIONAL: (703) 527-3887

NON-TRANSPORTATION
Bayer Emergency Phone: (412) 923-1800
Bayer Information Phone: (800) 662-2927

1. Product and Company Identification

Product Name:	POLYETHER LB-25 (BAYER)
Material Number:	6084656
Chemical Family:	Polyether Polyol
Chemical Name:	Poly(oxyalkylene) Polymer
CAS-No.:	9038-95-3

2. Hazards Identification

Emergency Overview

Color: Colorless to light yellow **Form:** liquid **Odor:** Odorless.
Product poses little or no hazard if spilled. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Irritating gases/fumes may be given off during burning or thermal decomposition.

Potential Health Effects

Primary Routes of Entry: Skin Contact, Eye Contact

Medical Conditions Aggravated by Exposure: None known.

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

General Effects of Exposure
Acute Effects of Exposure
For Product: POLYETHER LB-25 (BAYER)
Not expected to cause any adverse acute health effects.

Chronic Effects of Exposure
For Product: POLYETHER LB-25 (BAYER)
Not expected to cause any adverse chronic health effects.

Carcinogenicity:
No Carcinogenic substances as defined by IARC, NTP and/or OSHA

3. Composition/Information on Ingredients

Hazardous Components
This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

4. First Aid Measures

Eye Contact
In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact
In case of skin contact, wash affected areas with soap and water. Thoroughly clean shoes before reuse. Wash clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation
If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if irritation develops.

Ingestion
If ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

5. Fire-Fighting Measures

Suitable Extinguishing Media: carbon dioxide (CO_2), dry chemical, foam, water spray for large fires.

Special Fire Fighting Procedures
Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Use cold water spray to cool fire-exposed containers to minimize risk of rupture. Toxic and irritating gases/fumes may be given off during burning or thermal decomposition.

6. Accidental release measures

Spill and Leak Procedures
Dike or dam spilled material and control further spillage, if possible. Cover spill with inert material (e. g., dry sand or earth) and collect for proper disposal. Collect and place in appropriately marked sealable containers for disposal. Wash spill area with soap and water.

7. Handling and Storage

Storage Temperature:
maximum: 80 °C (176 °F)

Storage Period
36 Months

Handling/Storage Precautions
Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Keep container closed when not in use. Material is hygroscopic and may absorb small amounts of atmospheric moisture. If contamination with isocyanates is suspected, do not reseal containers. Avoid inhalation of vapour or mist.

Further Info on Storage Conditions
Material can be stored safely at ambient temperatures.

8. Exposure Controls / Personal Protection

Country specific exposure limits have not been established or are not applicable

Industrial Hygiene/Ventilation Measures
Under normal conditions of use, special ventilation is not required.

Respiratory Protection
None required under normal conditions of use., NIOSH approved air-supplied respirator during die cleaning, high temperature processing or when thermal decomposition is suspected.

Hand Protection
Permeation resistant gloves., Butyl rubber gloves., Nitrile rubber gloves., Neoprene gloves

Eye Protection
safety glasses with side-shields.

Skin and body protection
No special skin protection requirements during normal handling and use.

Additional Protective Measures
Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product.

9. Physical and chemical properties

Form:	liquid
Color:	Colorless to light yellow
Odor:	Odorless
Freezing Point:	25 - 30 °C (77 - 86 °F)
Boiling Point/Range:	> 250 °C (> 482 °F) @ 1,013 mbar
Flash Point:	> 229.44 °C (> 444.99 °F) (DIN 51376)
Evaporation Rate:	< 0.01
Vapor Pressure:	15 mbar @ 50 °C (122 °F)
Specific Gravity:	1.05 @ 20 °C (68 °F) (DIN 51757)
Solubility in Water:	Miscible
Autoignition Temperature:	390 °C (734 °F)
Viscosity, Kinematic:	565 mm2/s @ 20 °C (68 °F)
Bulk Density:	8.76 lb/gal @ 20 °C (68 °F)
Molecular Weight:	3,500

10. Stability and Reactivity

Hazardous Reactions
Hazardous polymerization does not occur.

Stability
Stable

Materials to avoid
oxidizing agents, Isocyanates

Hazardous decomposition products
By Fire and Thermal Decomposition: Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke, Other undetermined compounds

11. Toxicological Information

Toxicity Data for POLYETHER LB-25 (BAYER)
Acute Oral Toxicity
45 g/kg (Rat)
49 g/kg (mouse)
16 g/kg (rabbit)

Acute Inhalation Toxicity
106 mg/m3, 4 hrs (Rat)

Acute dermal toxicity
LD50: 21 k/kg

Eye Irritation
Irritating to eyes.

12. Ecological Information

Ecological Data for POLYETHER LB-25 (BAYER)
Acute and Prolonged Toxicity to Fish
LC50: 2,890 mg/l (Zebra fish (Brachydanio rerio))

13. Disposal considerations

Waste Disposal Method
Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Empty Container Precautions
Recondition or dispose of empty container in accordance with governmental regulations. Empty containers retain product residue; observe all precautions for product. Do not heat or cut container with electric or gas torch.

14. Transportation information

Land transport (DOT)
Non-Regulated

Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Non-Regulated

15. Regulatory Information

United States Federal Regulations

OSHA Hazcom Standard Rating: Non-Hazardous

US. Toxic Substances Control Act: Listed on the TSCA Inventory.

US. EPA CERCLA Hazardous Substances (40 CFR 302):
Components
None

SARA Section 311/312 Hazard Categories:
Acute Health Hazard

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A):
Components
None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required:
Components
None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):
If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

State Right-To-Know Information
The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Weight %	Components	CAS-No.
99 - 100%	Polyether Polyol	9038-95-3

California Prop. 65:
To the best of our knowledge, this product does not contain any of the listed chemicals, which the state of California has found to cause cancer, birth defects or other reproductive harm.

16. Other Information

NFPA 704M Rating

Health	1
Flammability	1
Reactivity	0
Other	

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

HMIS Rating

Health	1
Flammability	1
Physical Hazard	0
Personal Protective Equipment	B

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe
* = Chronic Health Hazard
A = Safety Glasses
B = Safety Glasses, Gloves
C = Safety Glasses, Gloves, Apron
D = Face Shield, Gloves, Apron
E = Safety Glasses, Gloves, Dust Respirator
F = Safety Glasses, Gloves, Apron, Dust Respirator
G = Safety Glasses, Gloves, Vapor Respirator
H = Splash Goggles, Gloves, Apron, Vapor Respirator
J = Splash Goggles, Gloves, Apron, Dust and Vapor Respirator
K = Air Line Hood or Mask, Gloves, Full Suit, Boots
L = Situation Requiring Special Handling

The method of hazard communication for Bayer MaterialScience LLC is comprised of Product Labels and Material Safety Data Sheets. HMIS and NFPA ratings are provided by Bayer MaterialScience LLC as a customer service.

Contact Person:	Product Safety Department
Telephone:	(412) 777-2835
MSDS Number:	R300265
Version Date:	09/13/2005
Report Version:	1.8